

THE EFFECT OF VARIED CROP PROPORTIONS AND SOIL N-LEVELS IN A MAIZE/BEAN INTERCROP: INSECT PEST DAMAGE ON BEANS.

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Introduction

Risch et al. (1983) reviewed literature on 198 insect pests of crops and reported that 53% showed lower levels in multiple cropping than sole crops, 18% were more abundant in mixtures, 9% showed no difference and 20% were variable in their responses. These effects have been attributed to presence of other non-host plants, camouflage of the preferred host, changes in texture or colour of the total background, masking of chemical attractants or presence of a repellent from a non-host plant.

Material and Methods

A field experiment was carried out in East Ithaca (Cornell University, New York) in 1990 and 1991 growing seasons to determine effects of intercrop proportions of bean and maize and of N levels on bean damage by Japanese beetles (*Popillia japonica*) and Mexican bean beetles (*Epilachna varivestis* Mulsant). The N levels were 0, 80 and 160 kg N/ha. The five crop proportions were sole maize, sole beans, 75% maize + 25% beans, 50% maize + 50% beans and 25% maize + 75% beans in a replacement series. Maize cultivar Pioneer 3925 was spaced at 90cm x 30cm (1990) and 90cm x 10cm in 1991 in addition to the 1990 spacing. Bean cultivar Ruddy (red kidney bush bean) was planted at 60cm x 10cm, 15cm from each maize row on either side. Each plot was 8m x 4.5m. The number of infected bean plants as percentage of total number of plants in the two central rows were recorded.

Results/Discussion

Pest damage was significantly reduced by intercropping beans with maize, with lowest bean proportion resulting in least damage (significant linear correlation) in both 1990 and 1991 (Table 1). This, probably, was due to shading effect of maize on beans. Stoop (1986) noted a similar response in a cowpea and cereal intercrop where an increase in cowpea intercrop density increased the incidence of pests in the system. The availability of maize in the system seems to have acted as a barrier to the pest movements further reducing damage in intercrops (Hasse and Litsinger, 1981). This could have been due to the shading effect which reduced population of Japanese beetles in the maize/bean intercrop. Wrubel (1984) observed low population of Japanese beetles in a soybean/maize intercrop compared to sole soybean. He attributed the effect to shading by maize. The shading and barrier effects of

maize could have lowered the population of Mexican bean beetles too. More work to confirm this is needed. Less pest damage under the high maize proportion cropping system of 1991 (Table 1) further confirms that shading might be a more determining factor in the control of these bean pests in intercropping.

Nitrogen level had no significant effect on pest damage on beans.

Table 1. The effect of bean proportions on the damage caused on beans by Japanese and Mexican bean beetles in sole and intercropped systems, 1990 and 1991 growing seasons.

Bean proportions	% Pest damage on beans		
	1990	1991(A)	1991(B)
25%	2.4a	1.2a	0.9a
50%	6.2ab	-	3.4a
75%	9.7bc	9.1 b	6.6 b
Sole beans	12.9 c	15.8 c	15.0 c
Linear	* * *	* * *	* * *
Quadratic	NS	NS	*

Means followed by a common letter are not significantly different at 5% level using LSD.

a 1991(A) Low maize population cropping (37,037 maize plants/ha. or 90cm x 30cm spacing)

b 1991(B) High maize population cropping (55,000 maize plants/ha or 90cm x 10cm space).

***, *, NS - Significant at 0.1%, 5% or Not significant, respectively.

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